Students' psychological state and its associated factors during an outbreak of COVID-19 in Pakistan: a web-based survey

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Abstract

Purpose – Coronavirus disease 2019 (COVID-19) pandemic has led to unprecedented mental health repercussions in the lives of every individual including university students. Therefore, study on students' psychological state and its associated factors during the pandemic are of importance. This study aims to discuss the aforementioned issue.

Design/methodology/approach – An online survey was done on a total of 207 university students of Pakistan to collect information on socio-demographic characteristics, concerns or fears amidst COVID-19 and mental distress. Validated tools; Perceived Stress Scale (PSS), Generalized Anxiety Disorder Scale (GAD-7) and Patient Health Questionnaire (PHQ-9)-Depression were used to assess stress, anxiety and depression, respectively.

Findings – Around 14% of the university students were experiencing severe stress and anxiety, while 8.2% had severe depression. The authors found that stress among university students was related to psychiatric illness or symptoms (OR = 5.1: 1.1, 22.9) and unpredictability due to the pandemic (OR = 3.7: 1.2, 11.2). The significant determinants of anxiety were psychiatric illness/symptoms (OR = 6.6: 3.4, 12.9), implementation of public health measures (OR = 3.7: 1.1, 11.6), employed mothers (OR = 2.4: 1.1, 5.0) and lack of support from university administration (OR = 2.2: 1.0, 5.0). While the factors associated with depression included psychiatric illness or symptoms (OR = 8.4: 3.3, 21.5), unpredictability due to pandemic (OR = 6.8: 2.2, 20.7), impaired social support system (OR = 3.7: 1.3, 10.4) and studying without a scholarship (OR = 2.1: 1.0, 4.4).

Research limitations/implications – These findings call for an urgent need to develop appropriate interventions and educational programs that could address the psychological needs of students.

Practical implications – The study directs the role of university and faculty in dealing the mental health needs of the student in COVID-19 pandemic time.

Social implications – Educational programs are important that could address the psychological needs of students in COVID-19 pandemic.

Originality/value – University students reported mental distress during COVID-19 pandemic which shows that younger people are at risk of COVID-19 repercussions. Moreover, several stressors (i.e. impaired social

support system and lack of support from universities) were revealed that could be mitigated by implementing appropriate strategies.

Introduction

Mental illnesses are one of the significant factors that cause disability in society (Dong, Freedman, & de Leon, 2020). Individuals experiencing an outbreak or natural disaster have long-lasting negative consequences on their well-being (Morganstein & Ursano, 2020). Evidence also suggests that undergoing stressful events in life and being unable to cope with them are strong indicators of stress, anxiety and depression (Zhuo *et al.*, 2020). Currently, the world is undergoing a perilous condition caused by novel coronavirus (COVID-19) that has contributed to huge psychological crises across all population including vulnerable groups (students, older people and individual with chronic diseases) (Dipasquale, Passanisi, Cucinotta, Cascio, & Romano, 2021; Kang *et al.*, 2020; Liu *et al.*, 2021; Moulin *et al.*, 2023; Sepúlveda-Loyola *et al.*, 2020; Xiong *et al.*, 2020). Global health experts and South Asian governments have stated concern about the COVID-19 rapid transmission that could possibly lead to more than 7.6 million loss of life in the South Asian region if no proper steps are taken (Walker *et al.*, 2020). Therefore, governments across the world have taken strict public health measures and implemented lockdowns all over the country to halt all public and private activities (Fawaz & Samaha, 2021). Educational institutions have also enforced to withhold face-to-face classes (Ryan, 2023) which has increased unpredictability in the education sector (Sultan, Khan, Lee, & Oo, 2023); and it is estimated that globally more than 90% of enrolled learners (1.5 billion young individuals) are now out of education (Lee, 2020).

University students predominantly constitute a vulnerable group since unprecedented conditions of lockdown with academic and career uncertainties have multifaceted effects on mental well-being of students (Islam, Barna, Raihan, Khan, & Hossain, 2020; Mir, Ng, Mohd Jamali, Jabbar, & Humayra, 2023). The pandemic profoundly hit students' routine in terms of their learning journey such as moving to an online platform, closure of libraries, transition in the communication medium, administrative support, changes in assessment methods, new assignments with added workload (Aristovnik, Keržič, Ravšelj, Tomaževič, & Umek, 2020; Roche, Holdefer, & Thomas, 2022). A study finding also revealed that learning remotely was linked to more instances of study-life conflicts, which had a negative consequence on the mental health of students (Zainal Badri, Wan Mohd Yunus, Ramos, & Mahmud, 2022). Moreover, many undergraduate students have to hold their research work and internships and return to their respective homes because of university closures. Disturbances in their research work and internship imperil their program of study, delayed their graduation and destabilized their competitiveness in the job market, which ultimately created stress, anxiety and depression among students (Dworkin, Cai, LeBouef, & Hruska, 2023; Zhai & Du, 2020). Furthermore, the COVID-19 pandemic has badly impacted the social life of students as it has resulted in less interaction with friends, classmates and tutors. This isolated environment has limited their activity and intensified feelings of laziness and worthlessness leading to negative repercussions on their psychological well-being (Blázquez-Fernández, Lanza-León, & Cantarero-Prieto, 2023; Fawaz & Samaha, 2021). A multicenter study conducted during the COVID-19 crisis on participants aged 15 to 24 years showed that the overall prevalence of stress, anxiety and depression was 38.1%, 40.5% and 57%, respectively (Al Omari *et al.*, 2020). While another study conducted in Malaysia reported quite high prevalence of depression (51.9%), anxiety (46.9%) and stress (18.7%) among students (Rom, Mahmud, Suainbon, & Miskan, 2023).

The economic circumstances are also imposing detrimental impacts on the social and mental stability of the students (Galanza, Aruta, Mateo, Resurreccion, & Bernardo, 2023). Many students have lost their jobs and the imminent issue of room and board charges exacerbates their financial

insecurities leading to adverse mental health outcomes (Galanza *et al.*, 2023). Additionally many family members including parents have lost their employment or are facing pay cuts in the wake of this pandemic (Prior, de Heer, & Maas, 2023; Son, Hegde, Smith, Wang, & Sasangohar, 2020). A study also reported that financial insecurity and prolonged joblessness are strongly related with increased rates of mental distress among university students (Khoury-Malhame, Rizk, Joukayem, Rechdan, & Sawma, 2023; Kopels & Roulette, 2023; Salman *et al.*, 2022). Moreover, having chronically ill family members (parents or relatives) also raised their distress (Sögüt, Dolu, & Cangöl, 2021) and added to financial burden. Also, due to financial barriers many students were unable to access the online classes that was one of the strongest factors for distress among students (Chugh, Aqeel, & Gera, 2023; Desabayla, 2023; Fawaz & Samaha, 2021; Rahman & Mohsin, 2023; Zhai & Du, 2020). Thus, fear of uncertainties regarding COVID-19 along with sudden changes in teaching and assessment methods has exerted a drastic stress on students that has impaired their mental well-being (Aqdas, Ahmed, & Soomro, 2023; Nurkhin, Martono, & Pramusinto, 2023). Different studies also highlighted that the mental distress among young people has significantly grown in recent years that is related with various factors including achievement pressure, social media and the persistent use of internet (Merikangas *et al.*, 2010; Siegel & Dickstein, 2011; Te Wildt, 2018; Zendle and Bowden-Jones, 2019) as well as several complex issues inside the family (Murray, Creswell, & Cooper, 2009). Undoubtedly the COVID-19 pandemic has further heightened their distress that is linked with drastic health impact (Haris & Al-Maadeed, 2021; Ho, Chee, & Ho, 2020; Thompson, Garfin, Holman, & Silver, 2017; Zulkifli, Sivapatham, & Guan, 2020).

Pakistan reported the first COVID-19 case on February 26, 2020 (Mukhtar, 2020). There were about 623,135 confirmed cases as of March 20, 2021. To control the transmission of virus, the government directed academic organizations to cease activities on March 13, 2020. After that, on March 23, 2020, a 14-day lockdown was put into effect during that time all activities were forbidden (Chandir, Siddiqi, Setayesh, & Khan, 2020). The countrywide smart lockdown started on March 27, 2020, and was eventually phased down, similar China and Italy (Kouser, Kausar, & Ghani, 2020). The activity restrictions aimed to minimize virus transmission, lower its incidence and lessen the strain on the healthcare system in order to save lives (Bonardi, Gallea, Kalanoski, & Lalive, 2023; Storopoli, Braga da Silva Neto, & Mesch, 2020). In reaction to pandemics, closing educational institution has remained an effective tactic for reducing virus transmission rates and flattening the incidence peaks (Kaur, 2023; Safdar, Habib, Amjad, & Abbas, 2020; Storopoli *et al.*, 2020). Because it reduced face-to-face student interaction, preventing them from disease, this approach seemed to be highly effective (Abdulamir & Hafidh, 2020; Bano, Ahmad, Khan, & Khan, 2023). On the other side, it had negative impact on the students due to disturbance in their daily routine causing deterioration in physical and emotional health (Abbas, 2020; Isobel, 2022; Leal Filho *et al.*, 2021; Merylin, Cristina, & Paolo, 2022). A study conducted in university students of Punjab, Pakistan revealed that the burden of psychological distress was 41% among students (Khawar *et al.*, 2021).

There are some preliminary studies in Pakistan that determine how psychological distress affects students' academic performance during the COVID-19 epidemic (Song, Chen, Tao, Su, & Peculea, 2020). Moreover, an observational study conducted on private university students of Lahore, Pakistan from April to May 2020 showed daily routine restrictions (92%), uncertainty about the future (85%), low mood (84%) and feeling bored (84%) were the most common symptoms reported during COVID-19 pandemic (Mahmood, Saleem, Subhan, & Jabeen, 2021). Furthermore, an online learning has significantly increased mental distress among students, particularly in terms of fear of failure (Siddique, Hamayun, & Khan, 2022). Evidence showed that unequal distribution of resources, logistic issues, limited IT expertise and lack of competency in English language among students are found to be important factors in failure of online medium in Pakistan, despite having multiple benefits (Haris & Al-Maadeed, 2021; Siddique *et al.*, 2022). Additionally, a survey finding notified that fear associated with COVID-19 was greater among the students and it was strongly correlated

with personal or history of disease and mortality within the family (Rafiq, Rafique, Griffiths, & Pakpour, 2021). Given that, the rapid transmission of the COVID-19 virus and unforeseen conditions, it is critical to assess the psychological experience of university students in Pakistan during COVID-19 pandemic. This will assist educational institutions to plan and execute effective interventions and strategies to mitigate the distress of the students at large. Therefore, the present study is distinctive as it is designed to examine the academic concerns and fears related to COVID-19, as well as prevalence and underlying factors associated with stress, anxiety and depression experienced by university students in Karachi, Pakistan.

Methodology
Study settings and design
The present cross-sectional study was carried out between August to September 2020, five months after the university closure due to the imposition of the COVID-19 pandemic lockdown in Karachi, Pakistan. Due to pandemic restriction, the data was collected through an online survey, which was shared on various social media platforms such as Facebook, WhatsApp, or Instagram. An online questionnaire was generated using the Google form. This e-questionnaire was circulated among students from diverse public and private universities of Karachi, Pakistan. The study provided no incentives to students.

Sampling procedure and study participants
The non-probability sampling, i.e. purposive snowball technique was employed in the current study since it began with a limited number of initial contacts who fulfilled the eligibility criteria who referred more possible participants, and so on (snowball effect). Similarly, in the current study all the students shared the online survey link within their institutional groups on social networking sites. Undergraduate and postgraduate students irrespective of their gender were enrolled to complete self-administered online questionnaire. The e-questionnaire was designed to collect information related to socio-demographic characteristics, concerns or fears amidst COVID-19 and psychological distress levels (stress, anxiety and depression). Before initiation of survey, students were asked to provide informed consent and they were inquired about their readiness to participate by asking: "Are you willing to participate in this study voluntarily and freely? If the students responded "yes", they were then given access to the survey form. The survey was completed within 10-15 minutes on average.

Eligibility criteria
Inclusion criteria

(1) Students (aged $\geq$ 18 years) studying in a private and public university in Karachi, Pakistan, were enrolled in the study

(2) Students, including both undergraduates and postgraduates, irrespective of gender were eligible to become part of the study

(3) Able to read and understand English

(4) Eligible student has an easy access to internet connectivity within their area

Exclusion criteria

(1) Students who have tested positive for COVID-19 and are quarantined or isolated due to recent exposure were excluded

(2) Students who refused to provide informed consent

Measurements

Perceived stress scale (PSS). The PSS is commonly used psychological instruments for measuring stress perception and it is a self-administered tool that was created by Cohen and his colleagues (Cohen, Kamarck, & Mermelstein, 1983). The psychometric features of PSS have been thoroughly validated and is noted to be reliable (Cohen *et al.*, 1983; Kaplan & Sadock, 1988; Shriram, Bhimani, Aundhakar, Zingade, & Kowale, 2015) with Cronbach's α = 0.78 to 0.90 (Cohen, 1988; Qin, Vlachantoni, Evandrou, & Falkingham, 2018; Shruthi, Veena, & Seeri, 2023). The tool is translated into various languages such as Chinese, Turkish, Spanish and Japanese (Cohen, 1988; Cohen *et al.*, 1983) while we used original tool in English language. The PSS is a measured of the degree to which circumstances in one's life are assessed as stressful. Items were intended to tap how unpredictable, uncontrollable and over-burdened respondents find their lives. The scale also incorporated various direct questions about the stress currently being experienced. The PSS was intended for used in community settings with at least a junior high school education level. The items were straightforward, and the response choices were easy to grasp. The questions in the PSS inquired about feelings and thoughts during the preceding month. For each situation, respondents were asked how frequently they felt in a specific way. PSS composed of five-point Likert rating scale, ranging from never (0) to very often (4); for four-positive questions (i.e. 4, 5, 7 and 8) scores were reversed. The total scores varied from 0 to 40, with higher scores indicating higher perceived stress (Masa'Deh, Alhalaiqa, AbuRuz, Al-Dweik, & Al-Akash, 2017; Sathiya *et al.*, 2016). PSS is not a diagnostic instrument however it can be employed as a screening tool to classify people with elevated stress levels. Since it is not a diagnostic tool, there is no set cut-off score to imply increased stress levels (Shruthi *et al.*, 2023). However, greater scores are thought to represent a higher stress level (Klein *et al.*, 2016; Schneider, Schönfelder, Domke-Wolf, & Wessa, 2020). An arbitrary score of 0 to13 for low, 14 to 26 for moderate and 27 to 40 for high perceived stress were set and used in previous study (Shruthi *et al.*, 2023). In the current study, low stress levels were regarded as having no stress whereas moderate and high stress levels were combined and treated as having stress (Khalili, Ebadi, Tavallai, & Habibi, 2017; Seedhom, Kamel, Mohammed, & Raouf, 2019).

Generalized anxiety disorder scale (GAD-7). The seven-item Generalized Anxiety Disorder Scale (GAD-7) is one of the most broadly utilized instruments for identification and screening of anxiety disorder. It is a module of the Patient Health Questionnaire which is simply the main detailed survey developed for essential consideration, to help in diagnosis of a particular disorder (Toussaint *et al.*, 2020). GAD-7 takes less than three minutes to finish and is simple to score (Budikayanti *et al.*, 2019). Original English language version was used in the present study. The GAD-7 is the most generally utilized measure of anxiety used in clinical practice and research because of its diagnostic reliability and effectiveness (Johnson, Ulvenes, Øktedalen, & Hoffart, 2019). It can be applied for screening, diagnosis and assessment of severity of anxiety disorders, as well as for social phobia, post-traumatic stress disorders and panic disorders (Moreno *et al.*, 2019). Scores of 5, 10 and 15 are taken as cut-off points for mild, moderate and severe anxiety, respectively. When used as a screening tool, further evaluation is recommended when the score is 10 or greater. Using the threshold score of 10, GAD-7 has a sensitivity of 89% and a specificity of 82% with Cronbach's α = 0.79 to 0.91 (McLafferty *et al.*, 2021). It is moderately good at screening three other common anxiety disorders: panic disorder (sensitivity 74%, specificity 81%), social anxiety disorder (sensitivity 72%, specificity 80%) and post-traumatic stress disorder (sensitivity 66%, specificity 81%) (Robert, Spitzer, Kroenke, & Williams, 2006).

Patient health questionnaire (PHQ-9)-depression. The depression was assessed using the original English language version of nine-item Patient Health Questionnaire (PHQ-9). The PHQ-9 questionnaire is a self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD) which measured the presence of major depressive disorder using modified Diagnostic and Statistical Manual fourth edition (DSM-IV) criteria. The PHQ-9 score

≥10 has a sensitivity of 88% and a specificity of 88% for major depression based on the mental health expert re-interview as the criterion standard having Cronbach's α = 0.78 to 0.975 (Chowdhury, Suvro, Farhan, & Uddin, 2022; Kroenke, Spitzer, & Williams, 2001; McLafferty *et al.*, 2021). The PHQ-9 is also a short, simple, reliable and valid tool for criteria-based diagnoses of depressive disorders that helped to measure depression severity and is a useful clinical and research tool (Kroenke and Spitzer, 2002). A provisional diagnosis of depression is made based on the PHQ-9 score greater than 4 whereas, the presence of major depressive disorder is made if the score is greater than or equal to 10; which is also used in present study. The severity of depression was classified as follows: mild [5–9], moderate [10–14], moderately severe [15–19] and severe [20–27] depression (Kroenke *et al.*, 2001).

Ethical considerations. This study was approved by the Aga Khan University Ethical Review Committee (AKU-ERC-2020-5088-11824) in Karachi, Pakistan. In the first section of the online questionnaire, all the study participants consented. Study participants were assured that their information will remain confidential, and no identifying information will be disclosed in the online survey.

Data analysis. Data was entered in Microsoft Access (2007 – 2010) and analyzed using STATA version 16. Normality of the outcome variable was witnessed by using histogram. All normally distributed continuous variables were summarized with their respective means and standard deviations. For categorical variables, frequencies and percentages were reported. Binary logistic regression was used to determine factors associated with stress, anxiety and depression among students by coding the outcome variable into binary categories, i.e. stress = 'yes' and 'no', anxiety = 'yes' and 'no' and depressed = 'yes' and 'no'. We used cutoff score of ≥14 for formation of stress categories. We used a cutoff score of ≥10 for formation of depression and anxiety categories, respectively.

Binary logistic regression analyses was performed. However, it has been proposed that the selection of the covariates or predictors should initiate with the univariate analysis (Hosmer, Lemeshow, & Sturdivant, 2013). This is based on the result of Wald test and Change in Log Likelihood from the logistic regression analyses model (Bursac, Gauss, Williams, & Hosmer, 2008). As a result, independent variables that are clinically and causally relevant having p-value < 0.25 at the univariate analysis level should be considered as statistically significant raising the chances of random error (type I error) from 5% to 25% and are carried forward using a manual forward stepwise procedure to build a multivariable parsimonious model (Chowdhury & Turin, 2020; Harrell, 2001; Hosmer *et al.*, 2013). Therefore, for the final model, an adjusted odds ratio (AOR) with 95% CI was reported with a p-value of <0.05 as being statistically significant.

Results

A total of 207 students completed the online questionnaire and were included in this study. The mean age ± SD of students was found to be 23.8 ± 5.6 years, representing more females (82.1%, n = 170) than males. Majority of the students (81.6%) were single and around 71.5% were pursuing a bachelor's degree program. Almost 43.4% of the students had relatives/acquaintances that were found to be infected with COVID-19. Moreover, nearly 36% of the students had a history of psychiatric illness or symptoms, and approximately 27% of them had a family history of psychiatric illness or symptoms.

Using the stress, anxiety and depression tool, it was noted that 76.3% of students reported moderate and 14% were having high levels of perceived stress. The frequency of moderate and severe anxiety was noted to be 25.7% and 14.4%, respectively. While almost 19.3% and 8.2% of the students suffered from moderate and severe depression respectively. The demographic and selected characteristics of the study participants are shown in Table 1.

Baseline characteristics	n (%)
Age*	23.8 ± 5.6
Gender	
Female	170 (82.1%)
Male	37 (17.9%)
Academic degree	
Bachelors	148 (71.5%)
Masters	56 (27.0%)
Doctor of Philosophy	3 (1.5%)
Studying without scholarship	149 (72.0%)
Marital status	
Divorced/Separated/Widowed	4 (2.0%)
Engaged	11 (5.3%)
Married	23 (11.1%)
Single	169 (81.6%)
Ethnicity	
Urdu Speaking	67 (32.3%)
Gilgiti	54 (26.1%)
Sindhi	24 (11.6%)
Gujrati	24 (11.6%)
Katchi	15 (7.3%)
Pashto	13 (6.3%)
Other	10 (4.8%)
Currently residing	
Living with parents	173 (83.6%)
Living in a rented house	16 (7.7%)
Living in a hostel	11 (5.3%)
Living at relative/friend house	7 (3.4%)
Employed mother	46 (22.2%)
Employed father	134 (64.7%)
Engaged in paid employment	50 (24.2%)
Extended family system	59 (28.5%)
Monthly income (Rs = Rupees)	
Less than Rs. 5,000	7 (3.4%)
Rs 5,000 - 10,000	5 (2.4%)
Rs 10,001- 20,000	21 (10.1%)
Rs 20,001 - 40,000	48 (23.2%)
More than Rs 40,000	126 (60.9%)
Past psychiatric illness or symptom	74 (35.7%)
Family having psychiatric illness or symptom	55 (26.6%)
Chronic medical history (HTN, DM & etc)	25 (12.1%)
Relative or acquaintance got COVID-19	90 (43.4%)
Impaired social support system	180 (86.9%)
Mean stress score among students*	
Perceived stress (PSS-10)	20.3 ± 5.0
Low (0–13)	20 (9.7%)
Moderate (14–26)	158 (76.3%)
High (27–40)	29 (14.0%)
Mean anxiety score among students*	8.2 ± 5.4
Anxiety (cutoff score of 10)	83 (40.1%)
	(*continued*)

Table 1.
Baseline
characteristics of
university students of
Karachi,
Pakistan (n = 207)

Baseline characteristics	n (%)
Minimal	65 (31.4%)
Mild	59 (28.5%)
Moderate	53 (25.7%)
Severe	30 (14.4%)
Mean depression score among students*	9.3 ± 6.9
Depression (cutoff score of 10)	143 (69.1%)
None	64 (31.0%)
Mild	55 (26.5%)
Moderate	40 (19.3%)
Moderately severe	31 (15.0%)
Severe	17 (8.2%)

Note(s): *Mean Standard deviation (SD)
Source(s): Authors work

Table 1.

Fear and academic concern related to COVID-19 among university students are depicted in Table 2. Approximately, three-fourth (74.8%) of the students feared getting COVID-19 infection. Overall, 89.3% of the students were concerned about financial hardships during the pandemic. Majority of students 96.6% of the students stated that they faced challenges (internet connectivity and electricity) during online-classes whereas, about three fourths (74.4%) of the students mentioned that online medium was not as effective as compared to face-to-face.

The findings from univariate logistic regression are summarized in Table 3, examining the association between stress, anxiety and depression with sociodemographic and academic characteristics. Findings from multivariable logistic regression model showed that stress level among university students was related to psychiatric illness or symptoms (OR = 5.1, 95% CI: 1.1, 22.9) and unpredictability due to pandemic conditions (OR = 3.7, 95% CI: 1.2, 11.2). Moreover, it was found that students with past psychiatric illness or symptoms were 6.6 times (OR = 6.6, 95% CI: 3.4, 12.9) more likely to exhibit anxiety symptoms than students

	n (%)
Fears/Concerns	
Getting COVID-19 infection	155 (74.8%)
Family getting infection	187 (90.3%)
Shortage of supplies (food and medical)	163 (78.7%)
Financial hardships	185 (89.3%)
Implementation of public health measures	182 (88.0%)
Academic problems	
Delay in academics assignments (research work)	194 (93.7%)
Delay in graduation	179 (86.4%)
Lack of support from the university administration	37 (17.9%)
Switching to an online medium	167 (81.0%)
Difficult to focus lectures at home	198 (95.6%)
Ineffectiveness of online platform	154 (74.4%)
Challenges during online- classes (internet connectivity and electricity)	200 (96.6%)
Future employment	183 (88.4%)
Unpredictability due to pandemic	184 (88.9%)
Source(s): Authors work	

Table 2.
Fears, concerns, and academic problems amidst COVID-19 among university students of Karachi Pakistan (n = 207)

Characteristics	Stress[a] Unadjusted Odds Ratio OR	95% CI	Anxiety[b] Unadjusted Odds Ratio OR	95% CI	Depression[c] Unadjusted Odds Ratio OR	95% CI
Studying without scholarship	1.4	0.5, 3.8	1.3	0.7, 2.6	2.1	1.1, 4.0*
Employed Mother	1.1	0.3, 3.6	2.6	1.3, 5.2*	2.1	1.0, 4.7*
Fear of getting COVID-19 infection	0.9	0.3, 2.8	1.5	0.7, 2.9*	1.9	1.0, 3.7*
Relative or acquaintance got COVID-19	1.7	0.4, 6.6	1.7	1.0, 3.0*	1.5	0.8, 2.8*
Past psychiatric illness or symptom	5.6	1.2, 25.0*	6.3	3.3, 11.8*	7.1	3.0, 16.8*
Family having psychiatric illness or symptom	3.5	0.7, 15.8	1.8	0.9, 3.4*	1.4	0.7, 2.8
Impaired social support system	1.1	0.3, 4.3	1.6	0.7, 4.0*	3.3	1.4,7.6*
Delay in graduation	1.6	0.5, 5.5	1.2	0.5, 2.8	2.5	1.1, 5.7*
Lack of support from university administration	2.0	0.4, 9.3	2.2	1.1, 4.7*	1.2	0.5, 2.7
Future employment	2.9	0.9, 9.0	1.3	0.5, 3.4	3.0	1.2, 7.2*
Unpredictability due to pandemic	4.2	1.4, 12.6*	1.2	0.5, 3.1	8.2	3.0, 22.1*
Implementation of public health measures	0.7	0.1, 3.6	3.0	1.1, 8.3	0.8	0.3, 2.1

Note(s): OR, odds ratio; CI: conference interval; [a] Stress with a clinical cutoff 14; [b] Anxiety calculated using the Generalized Anxiety Disorder–7 with a clinical cutoff score of 10 [c] Depression was calculated using the Patient Health Questionnaire–9, with a clinical cutoff score of 10; significant (*) $p < 0.25$
Source(s): Authors work

Table 3.
Logistic regression analysis of factors associated with anxiety and depression among university students of Karachi, Pakistan (n = 207)

with no such complaints. Implementation of public health measures was also noted to be a significant factor for anxiety among university students (OR = 3.7, 95% CI: 1.1, 11.6). Students whose mothers were employed were 2.4 (OR = 2.4, 95% CI: 1.1, 5.0) times more likely to suffer from anxiety as compared to those who were unemployed. Students were twice more likely to be anxious (OR = 2.2, 95% CI: 1.0, 5.0) due to the lack of support from university's administration. On the contrary, students having past psychiatric illness or symptoms were 8.4 times (OR = 8.4, 95% CI: 3.3, 21.5) more likely to be depressed than those who did not have such history. The unpredictability due to current conditions was also one of the strongest predictors of depression among university students (OR = 6.8, 95% CI: 2.2, 20.7). Similarly, those who have impaired social support system and were studying without scholarship were more likely to be depressed with an OR of 3.7 (OR = 3.7, 95% CI: 1.3, 10.4) and 2.1 (OR = 2.1, 95% CI: 1.0, 4.4), respectively as mentioned in Table 4.

Discussion
The COVID-19 pandemic is the most disturbing and challenging public health issue that has brought unexpected agony and suffering across the globe. Moreover, the implementation of lockdown in socioeconomically fragile countries like Pakistan can aggravate health inequalities and its effect can cause vicious cycle between poverty and ill-health. (Hewlett, Takino, Nishina, & Prinz, 2021; Lancet, 2020). Thus, the pandemic has not just added to high mortality rate from viral contamination but had a serious impact on psycho-emotional well-being of people across all age groups including university students. Current findings

Characteristics	[a] stress Adjusted Odds Ratio		Anxiety Adjusted Odds Ratio		Depression Adjusted Odds Ratio	
	OR	95% CI	OR	95% CI	OR	95% CI
Past psychiatric illness or symptom	5.1	1.1, 22.9*	6.6	3.4, 12.9*	8.4	3.3, 21.5*
Unpredictability due to pandemic	3.7	1.2, 11.2*	–	–	6.8	2.2, 20.7*
Impaired social support system	–	–	–	–	3.7	1.3, 10.4*
Implementation of public health measures	–	–	3.7	1.1, 11.6*	–	–
Employed Mother	–	–	2.4	1.1, 5.3*	–	–
Lack of response from university administration	–	–	2.2	1.0, 5.0*	–	–
Studying without scholarship	–	–	–	–	2.1	1.0, 4.4*

Note(s): OR, odds ratio; CI: conference interval; [a] Stress using the perceived stress scale with a clinical cutoff 14
[b] Anxiety calculated using the Generalized Anxiety Disorder–7 with a cutoff score of 10
[c] Depression calculated using the Patient Health Questionnaire–9, with a cutoff score of 10
*signific*ant* = $p < 0.05$
Source(s): Authors work

Table 4.
Logistic regression analysis of factors associated with anxiety and depression among university student of Karachi, Pakistan (n = 207)

suggests that significant levels of stress, anxiety and depression exist among students in this pandemic era which is consistent with the past studies conducted on psychological distress among young people (Al Omari *et al.*, 2020; Hewlett *et al.*, 2021; Islam *et al.*, 2020; Leal Filho *et al.*, 2021; Rudenstine *et al.*, 2020). Previous outbreaks of SARS have also identified similar effects of the epidemic on mental well-being of university students (Wong, Gao, & Tam, 2007).

The present study also witnessed different factors that were significantly related to mental distress among students. The history of psychiatric illness or symptoms among students was one of the potential factors related to stress, anxiety and depression. This finding echoed with previous multinational study that reported an individual with a history of psychiatric illnesses showed more symptoms of psychological distress during COVID-19 pandemic (Moulin *et al.*, 2023). The probable reason behind this association might be, that individuals with a history of mental illness or any trauma are usually more sensitive to external stressors that can upsurge psychological symptoms during situations of unpredictability as in the current pandemic (Ho *et al.*, 2020).

In our study, the impaired social support system was another significant factor influencing depression among students. This finding is consistent with other research suggesting, that students are more susceptible to mental health problems when they experience a reduction in social and physical interaction during a lockdown. (Al Omari *et al.*, 2020; Leal Filho *et al.*, 2021; Xiong *et al.*, 2020). A plausible explanation is that students are more likely to experience psychological discomfort since they are under more stress to perform academically well. As a result students' social network played an essential element in buffering their stressors and enabling them to be more efficient (Stadtfeld, Vörös, Elmer, Boda, & Raabe, 2019). However, decrease social interactions, lack of social support and emerging stressors related to pandemic can adversely affect the psychological health of the students (Elmer, Mepham, & Stadtfeld, 2020; Leal Filho *et al.*, 2021). While role of technology can be utilized to foster social connection during COVID-19 pandemic (Zaeske *et al.*, 2022).

The novelty of the coronavirus and the uncertainty of the condition to return back to normal has put all individuals under extreme stress particularly when social interactions were restricted. In our study, it was witnessed that the unpredictability of the current condition was significantly associated with stress and depression among university students. Multiple studies were in cohesion with this finding, suggesting insecurity or uncertainty as one of the important contributors of mental distress (Islam *et al.*, 2020; Mahmood *et al.*, 2021; Son *et al.*, 2020). This might be because university students are mature adults who are interested in exploring their identities, working as autonomous individuals and have diverse responsibilities to accomplish (Arnett, 2000).

Another predictor of depression as evident in this study was studying without a scholarship. Unexpected financial insecurity has indulged university students in an unpleasant milieu that affects their psychological well-being (Aslan, Ochnik, & Çınar, 2020; Kim *et al.*, 2022). University students who were previously working to pay their tuition fees as well as supporting their family can hardly manage these expenses in this unprecedented time which might be one of the probable reasons behind this association (Islam *et al.*, 2020). However, our study found no link between socioeconomic status and the trajectory of psychological distress. Though, earlier research has demonstrated a strong association between psychological discomfort and a person's socioeconomic status (Hewlett *et al.*, 2021; Willey *et al.*, 2022).

Additionally, financial difficulties can have an impact on the family dynamics and relationships, which are crucial for adolescents' well-being (van Harmelen *et al.*, 2016). Ample studies have shown that the current pandemic has brought financial constraints on families resulting in negative connotations on students' health (Andrade, Gillen, Molina, & Wilmarth, 2022; Kim *et al.*, 2022; Rodrigues, Silva, & Franco, 2021). Students' perceive a lack of family support due to frustration and unfriendly home environment which makes them reluctant to vent out their feelings leading to poor mental health tendencies (Yu *et al.*, 2015). In our study, association between employed mothers and students' anxiety level was also reported. It can be inferred that employed women might experience greater challenges in the job sector as a result of the COVID-19 pandemic which adversely impacts them and has negative repercussions on their families, including adolescents (Andrade *et al.*, 2022; Kim *et al.*, 2022; Xiong *et al.*, 2020).

Previous research regarding mental health during COVID-19 pandemic showed, that the imposition of strict public health measures (handwashing, face-mask usage, social-distancing and switching to online platforms) has caused extreme anxiety and isolation among young people (AlAteeq, Aljhani, & AlEesa, 2020; Scott, McGowan, & Visram, 2021). In our study, implementation of public health measures was associated with increased anxiety levels among students. One of the possible association might be that, sudden transition restricts students' activity and constraint them within their houses creating negative emotions such as sadness, boredom, anxiety, irritation, etc. (Aristovnik *et al.*, 2020; Brooks *et al.*, 2020; Rezapour, Dehzangi, & Saadati, 2022; Son *et al.*, 2020). In addition to this, lack of support from university administration was noted to be a major contributor to students' anxiety in our study. Previous literature also mentioned that inadequate administrative support leading to lack of facilitation and lack of skill to adopt to an online medium has hindered students' academic goals ultimately resulting in devastating effects on their mental health (Al-Maskari, Al-Riyami, & Kunjumuhammed, 2022; Anwar, Khan, & Sultan, 2020).

This virtual survey allowed us to assess mental distress among students using a validated screening tool via maintaining social distancing during the current pandemic. Study highlighted significant findings that may be used by policymakers to address detrimental psychological effects during COVID-19 pandemic despite that it has several limitations.

One of the study limitations was the inability to connect directly with students and gather data in a systematic way due to the imposition of lockdown. Second is related to the use of

online Google forms for gathering data which excludes students who have limited access to internet facilities or resources (e.g. internet, electricity, smart phones, etc.) created hindrances in reaching students to be recruited for this study. Third was that our sample showed over-representation of female students which might point toward selection bias. Fourth was linked with sample size since the research team was unable to contact more students. In addition to this, reporting bias can be a potential limitation of this study, since it relies on self-reported data that may be influenced by students' perception of the scoring items. Lastly, study's statistical design does not by itself reveal the cause-and-effect relationship (temporality). Therefore, large scale interventional studies with greater sample size are required to fill out these gaps.

Conclusion

Globally, COVID-19 pandemic had a drastic impact on the lives of university students. This study also suggests that the psychological wellbeing of students has deteriorated and requires appropriate actions. Therefore, all authorities and stakeholders that are involved in higher education system should plan proactive measures to help students with this unprecedented challenge. Government authorities along with universities should plan to deliver psychological as well as financial support to university students through public–private partnerships. Special programs, i.e. scholarships or COVID-19 support student loans should be initiated to reach out to students who belong to low socioeconomic class. A mental health support system should be provided by adopting widespread use of telehealth services to deliver online counseling, stress management programs and other awareness programs that can reduce distress among students. Further to this, research is needed on more representative samples to determine psychiatric distress and examine risk factors that can direct the implementation of evidence-based mental health interventions during the next upcoming wave of the pandemic.

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